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Cover Picture: Yugoslav MICV M-980

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FOREWORD

1. The first four articles in this issue of the Review deal with equipments in the Yugoslav armoury. Two new equipments, a mechanised infantry combat vehicle (M-980) and a multi-barrel rocket launcher (YMRL 32/75), were unveiled for the first time on the Belgrade military parade in May this year. Both are designed and produced by Yugoslavia and illustrate well the increasing capabilities of the Yugoslav arms industry. The article on Yugoslav mines provides further evidence of this. Nevertheless, Yugoslavia still imports considerable quantities of arms from the Soviet Bloc and a recent acquisition of their's is the new SA-3 surface-to-air missile launcher.

2. An article on T-72, the new Soviet medium tank, describes this impressive addition to their armoured forces whilst another article describes the much older, but nevertheless still very potent, self-propelled air defence gun, the ZSU-23-4.

3. The continuing high level of interest by the Warsaw Pact in chemical defence is illustrated in the article on two new rapid decontamination machines, one of Polish and the other of Czech origin.

4. The remaining articles describe the interesting drill for loading the Soviet PKP wheeled amphibious trailer, a new Soviet VHF transceiver, the R-111, and finally two new military vehicles from Hungary and Poland respectively.

T B PALMER
Colonel Tech Int(A)

1.Yugoslav MICV M-980

The new Yugoslav MICV, the M-980, (Fig 1) was paraded in Belgrade for the first time on 9 May 1975. The MICV is similar in concept and appearance to BMP but it is not in any way a copy of the Soviet vehicle.

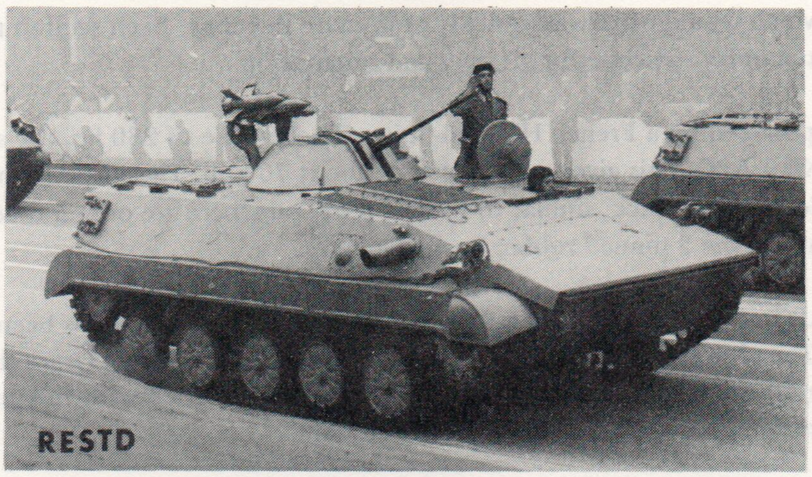

Fig 1. Yugoslav MICV – M-980

The armament, which is mounted in a small central turret, (Fig 2) consists of a 20 mm Oerlikon cannon and a 7.9 mm co-axial MG. These weapons can be used in the air defence as well as the ground role. In addition, 2 SAGGER wire guided ATGW are fitted to the rear of the turret on hinged launch rails. Spare missiles are probably carried inside but there is no provision for reloading while closed down.

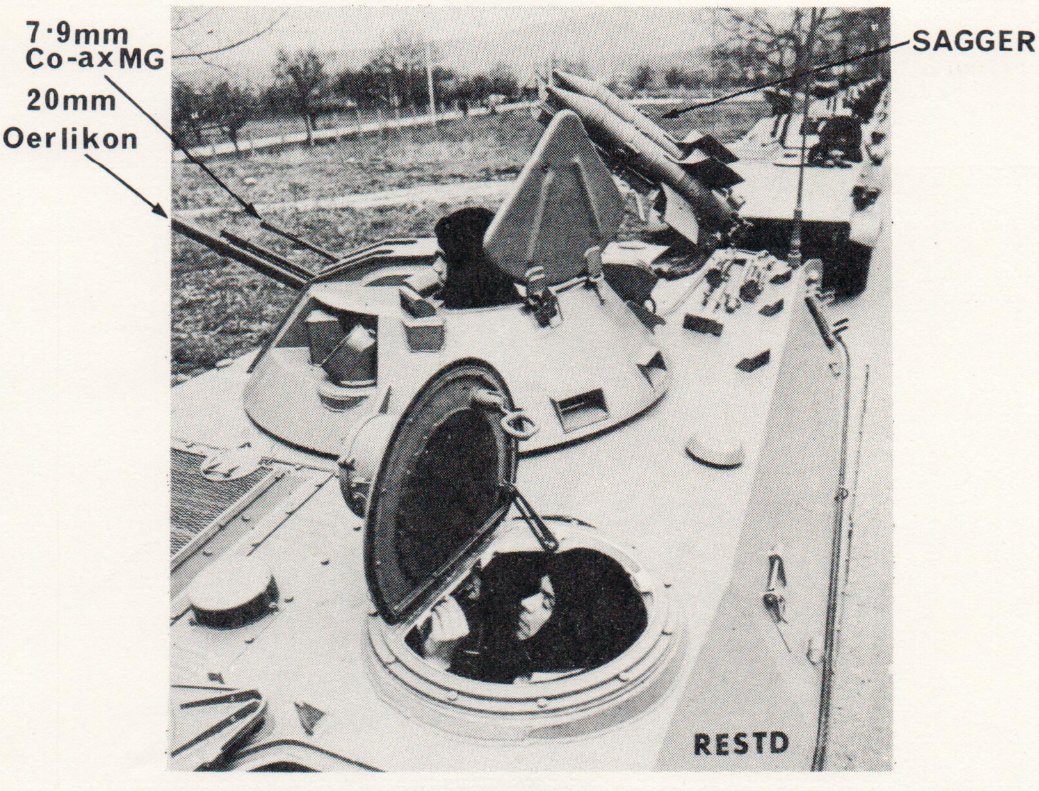

Fig 2. Close-up of Turret Armament

The vehicle has a crew of 3; their positions are the same as for BMP with the driver to the front left, behind him the commander who is also probably the section commander, and the gunner in the turret. Being some 2 feet shorter than BMP there is only room for a section of 6 in the back. There are a total of 8 firing ports for section weapons, 3 on each side and one in each rear door. These are of a sophisticated type with a ball and socket arrangement into which the rifle is fitted. An armoured aiming glass is provided and a suction tube fits over the breech of each rifle to remove the fumes emitted by firing which would otherwise quickly asphixiate the crew. Each section member is provided with a fixed unity episcope for viewing and orientation.

The MICV is powered by a French Hispano-Suiza diesel engine of 280 hp, the same as that fitted in the French AMX-10 APC. This gives a top speed of about 70 kph. The suspension is by torsion bars with top return rollers for the track, similar to that of BMP, but there are only 5 roadwheels. The tracks themselves are of the 2 pinned rubber bushed variety.

As with the APCs originating from the Soviet Bloc, armour protection has been sacrificed for swimming ability. The armour of M-980 will give protection against nothing larger than heavy machine gun fire or HE shell splinters. However, NBC protection is good with full collective protection for operation in nuclear or chemical environments.

The new MICV will be a very useful addition to the Yugoslav forces. The vehicles on parade were probably early production models and it will be some time before they enter service in any quantity. They will replace the present APC, the M-60, which has not been entirely satisfactory in service.

2. Yugoslav MBRL (YMRL 32/75)

GENERAL

During the May 1975 parade in Belgrade, Yugoslavia paraded its new multi-barrelled rocket launcher mounted on the FAP 2020 cargo vehicle (Fig 1). This 128 mm system has 32 tubes and a full spare salvo of rockets and is reported by the Yugoslav press to be highly automated. Yugoslavia has extensive armaments exports and the weapon could appear in several theatres of war.

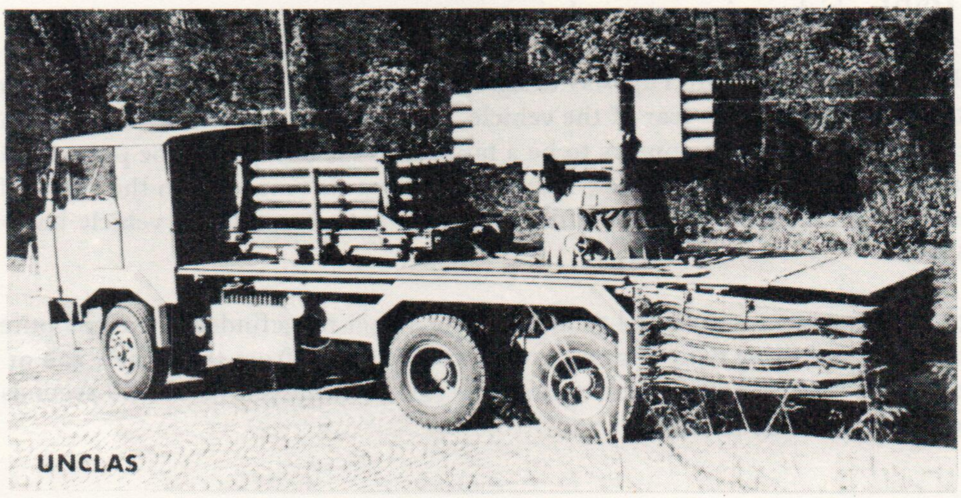

Fig 1. New Yugoslav Multi-Barrelled RL YMRL-32/75

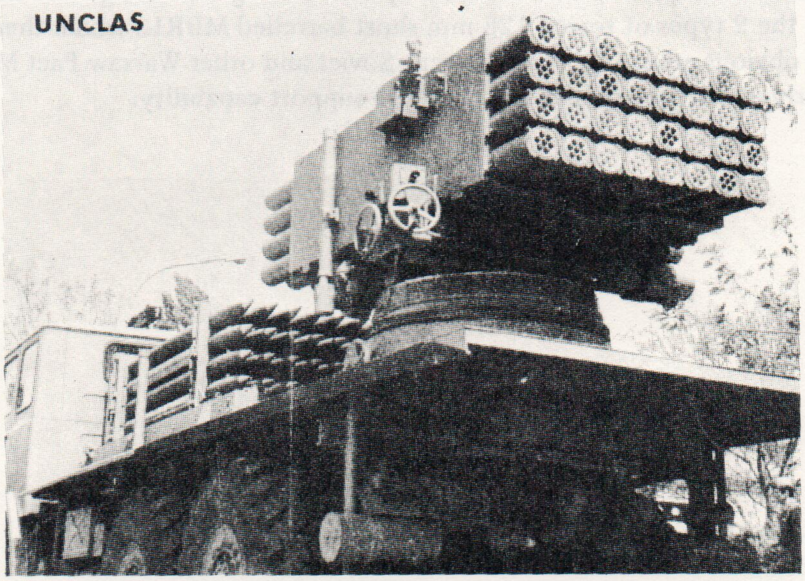

Fig 2. Close-up of Rocket Tubes

DESCRIPTION

Launcher. The rocket tubes, arranged in 4 layers of 8 tubes, (Fig 2) are encased in a protective box frame and mounted on a platform which has 360° traverse. There are 4 supporting legs which can be raised and locked into the corners of the launcher frame for travelling stability over rough terrain. The launcher is elevated hydraulically and probably traversed both manually and electrically. The rocket tubes are about the same length as those of the Soviet BM-21 multi-barrelled rocket launcher and have a similar spiral groove indicating spin stabilisation, as on the 128 mm rockets of the existing Yugoslav systems. On the other had they may, like BM-21, use a combination of slow spin and fins. The sighting system is located on the left side of the launcher beside the elevating and traversing gears.

Spare Salvo. A full spare salvo of rockets is mounted behind the vehicle cab in a loading rack. This platform is raised up to the launcher for reloading and the rounds are rammed into position hydraulically. This is a slightly different design to the Czech version (RM70) of BM-21, which is the only other MBRL which carries a spare salvo.

Vehicle. The vehicle, of Yugoslav design and manufacture, has 6 road wheels and a good cross country capability. At the rear of the vehicle, hinged and slung under the platform is an accordian type apparatus which appears to be a tarpaulin that can quickly be put over the launcher and spare salvo for travelling. The vehicle has a rotating cupola mounted on the cab roof with a .50 calibre Browining M2 machine gun; this is the first time that a Yugoslav B vehicle has been fitted with an AAMG.

Firing. This system is reported to incorporate a laser rangefinder and a computer for working out meteorological and firing data. Firing can be initiated either from the vehicle cab or from a remote firing point and it has been stated that the launcher can be deployed in 20–30 seconds with the first round launched 16 seconds later.

CONCLUSION

This weapon is a completely new launcher system of Yugoslav design and shows considerable advancement on the 2 types of towed 128 mm short barrelled MBRLs which their army already has in service. It has obvious advantages over current Soviet and other Warsaw Pact MBRL of similar calibres and clearly it will greatly increase their fire support capability.

3. SA-3 New Four Rail Launcher

Recent open press photography from Yugoslavia has shown a new 4 rail launcher (Fig 1) for the SA-3 surface to air missile system. It is expected that this launcher will replace the 2 rail launcher (Fig 2) now in service.

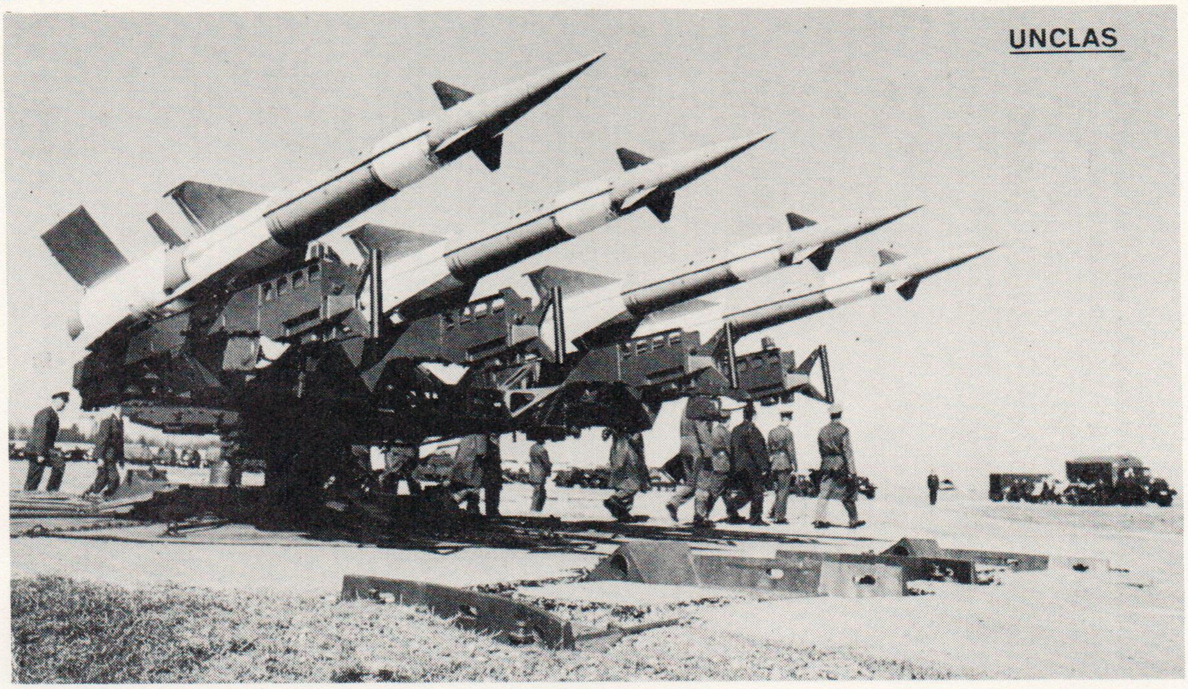

Fig 1. New SA-3 Four Rail Launcher

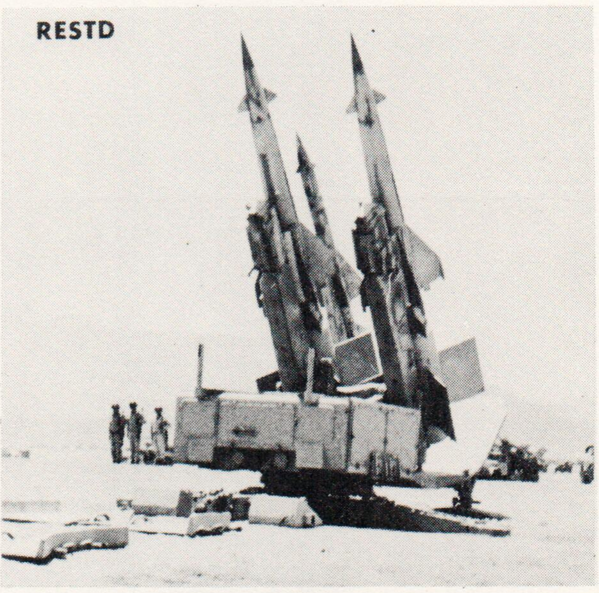

Fig 2. SA-3 Two Rail Launcher

An SA-3 site normally consists of 4 launch positions each containing one double launcher holding 2 GOA missiles. The introduction of the new 4 rail launcher holding 4 GOA missiles will double the number of missiles on launch rails ready to fire, and thus increase the sites initial reaction capability.

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4. Yugoslav Mines

Introduction

Yugoslavia has an active export market in military equipment and her mines could be met in almost any theatre of war. Yugoslavia used to rely on imported mines and fuzes and was principally dependent upon Czechoslovakia and the Soviet Union, but more recently has undertaken research, design, development and production of her own mines. This article describes some of these mines.

PMA-1 (Fig 1)

The PMA-1 (Protivpesadijska mina Antimagnetska) is a non-metallic anti-personnel mine of the same general design as the German Schu mine and the Russian PMD-6, but it has an olive drab plastic case and its fuze, the UPMAH-1, is also made of plastic. The only metal present is in the shell of the detonator. The mine is about 150 mm long, 60 mm wide and 30 mm high; it weighs 280 g and contains a standard 200 g explosive charge of either TNT or PE.

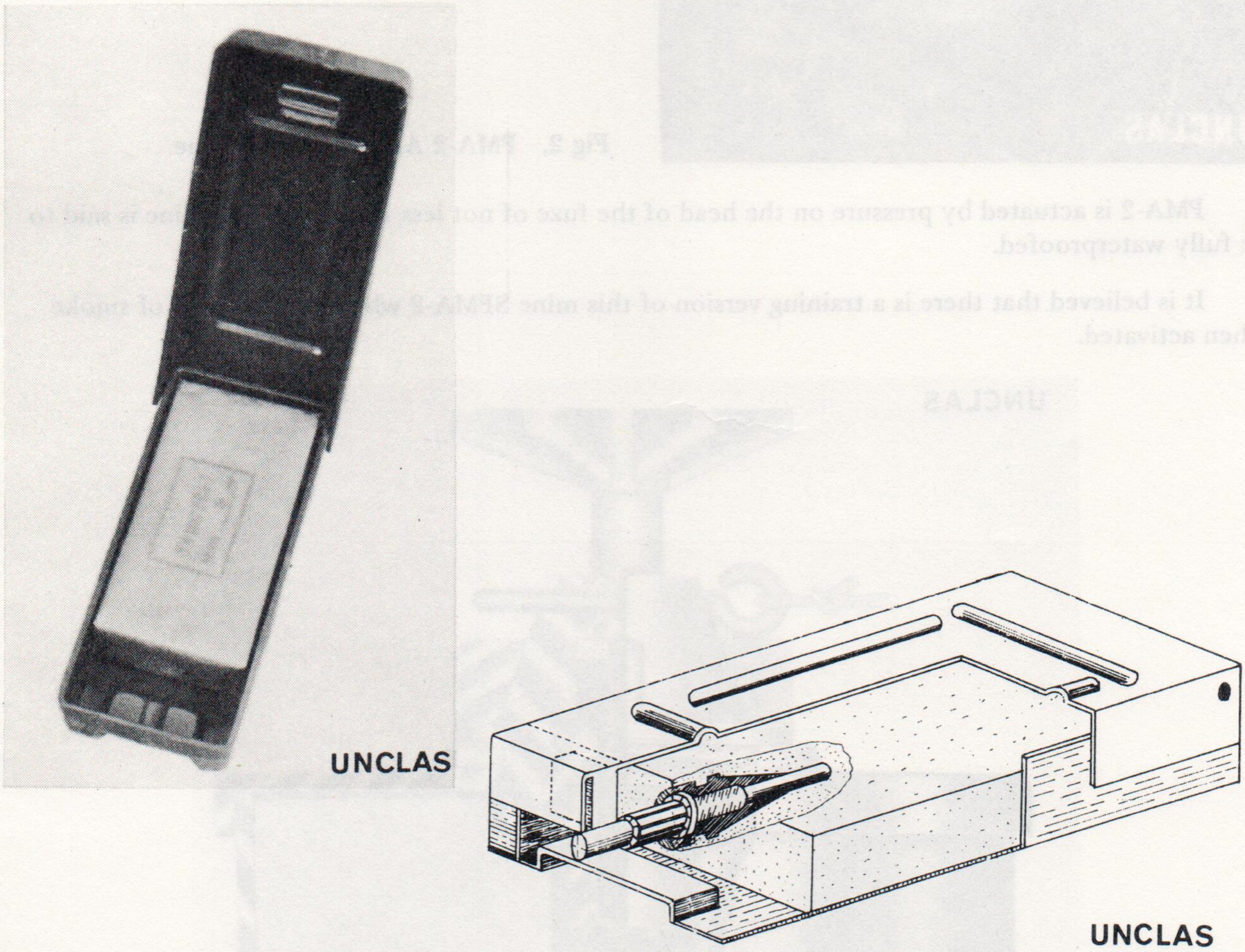
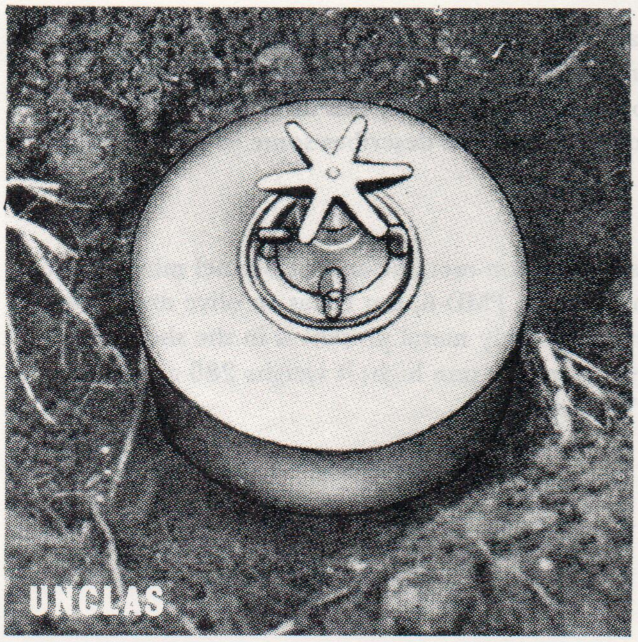


Fig 1. PMA-1 Anti-Personnel Mine

This mine is activated by a pressure of not less than 3 kg on the lid. The pressure is transmitted to the fuze which is initiated by a chemical crush capsule.

PMA-2 (Fig 2–3)

The PMA-2 is smaller non-metallic anti-personnel mine. It too, together with its fuze UPMAH-2, is made of plastic. The mine case is about 70 mm in diameter and 30 mm high. When fitted with a fuze the height is about 70 mm. It weighs 135 g and contains about 100 g of pressed TNT.



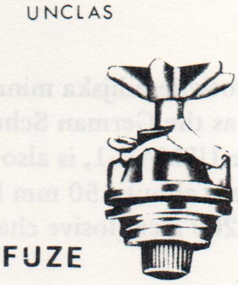


Fig 2. PMA-2 Anti-Personnel Mine

PMA-2 is actuated by pressure on the head of the fuze of not less than 5 kg. The mine is said to be fully waterproofed.

It is believed that there is a training version of this mine SPMA-2 which emits a puff of smoke when activated.

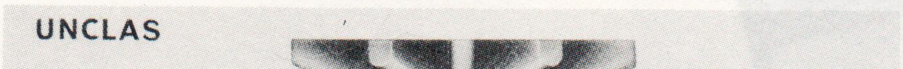


Fig 3. PMA-2 Cutaway View

TMA-3 and TMA-4 (Figs 4–5)

The TMA-3 (Fig 4), (Protivtenkovska mina Antimagnetska) and the TMA-4 (Fig 5) are non-metallic anti-tank mines; they are unusual in that they are virtually case-less. The body of the mine consists of the explosive charge which has been reinforced with fibre glass with a covering of water-proofed canvas olive drab in colour; this is said to be strong enough to resist damage in transit.

Instead of a conventional pressure plate, both mines are provided with 3 comparatively small fuzes spaced in a triangular configuration on the upper surface. The purpose of this arrangement is to prevent the initiation of the mine by blast over-pressures.

The case of TMA-3 is about 250 mm in diameter and 80 mm high. Its fuzes, the UTMAH-3, protrude about 30 mm above the upper surface of the mine and there is also a fuze well for an anti-handling device on the lower surface. It weighs about 7 kg and contains 6½ kg of explosive.

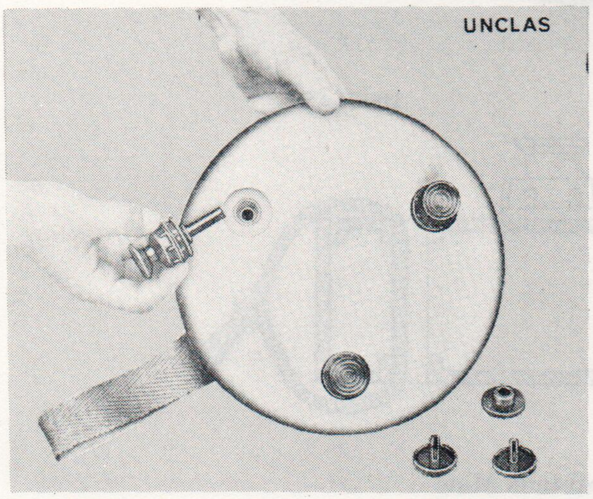
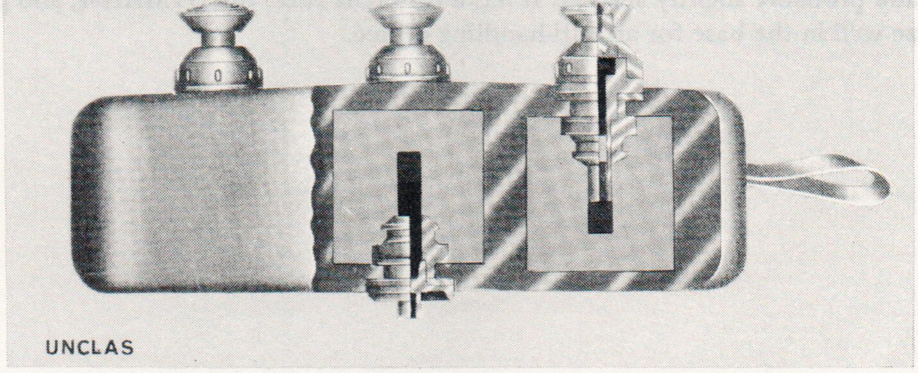


Fig 4. TMA-3 Anti-tank Mine



There is a training version of this mine, the STMA-3, which emits yellow smoke when activated.

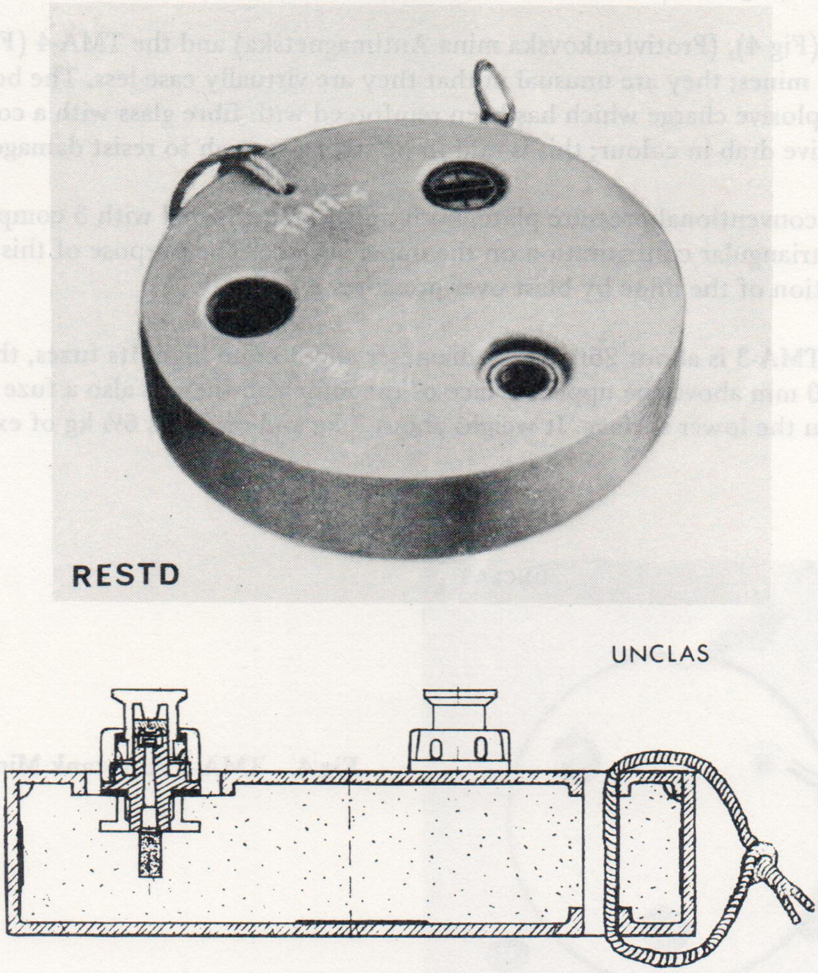


Fig 5. TMA-4 Anti-tank Mine

Fewer details are known about the TMA-4. It appears to be very similar to TMA-3 but is lighter (about 6 kg) and probably slightly smaller. It has a different fuze, the UTMAH-4, and probably does not have a fuze well in the base for an anti-handling device.

5. T-72 New Soviet Medium Tank

The production models of the new Soviet medium tank are called T-72. The trials models of the tank, which is the successor to the current T-62, have a variety of designators but are known collectively by the West as Medium Tank M-1970 T-72 is now in service in the Soviet army but as yet only inside Russia itself. However it is expected to appear in GSFG fairly soon to replace the remaining T-55s there.

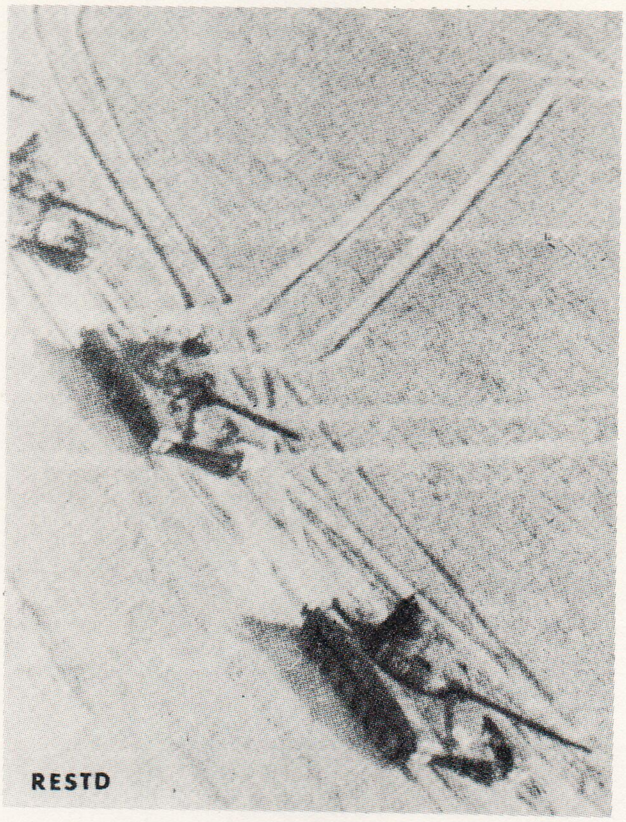


Fig 1. New Soviet Tank T-72

Compared to T-62 the new tank has a lower sleeker appearance – its overall height is some 150 mm less at 2.3 m. The weight is about the same as before, nearly 40 tonnes. The turret is placed further back on the hull and the sharply sloping glacis is emphasised by prominent front track guards. Another recognition feature is the new running gear which employs 6 small road wheels, and top return rollers for the track. Skirting plates protect the hull down to the top of the road wheels, but these are often not fitted during training.

Technically, T-72 is a considerable andvance on its predecessors; the Soviet designers have clearly paid attention to the weaknesses of T-62. The gun is a development of the 115 mm smooth bore fitted to T-62, and may be of a larger calibre, with an effective range of over 2,000 m against tanks. An automatic loader is fitted which should increase the rate of fire compared to T-62; this has resulted in a reduction of the crew to 3 men. Mobility is improved by a more powerful diesel engine and the new suspension layout gives a much smoother ride across country. Protection has not been neglected: The glacis is sloped at 70° compared to 60° on T-62 and the skirting plates will give increased immunity to chemical energy rounds. In addition the armour itself is probably of better quality steel.

The appearance of T-72 narrows the gap of technical superiority in tanks enjoyed by the West since World War II.

6. ZSU-23-4

One of the most potent weapons in the Soviet air defence arsenal is the self propelled 4 barrelled ZSU-23-4. Although designed in the late 1950s and introduced as long ago as 1965, this system is assessed as the most effective anti-aircraft gun in service anywhere today.

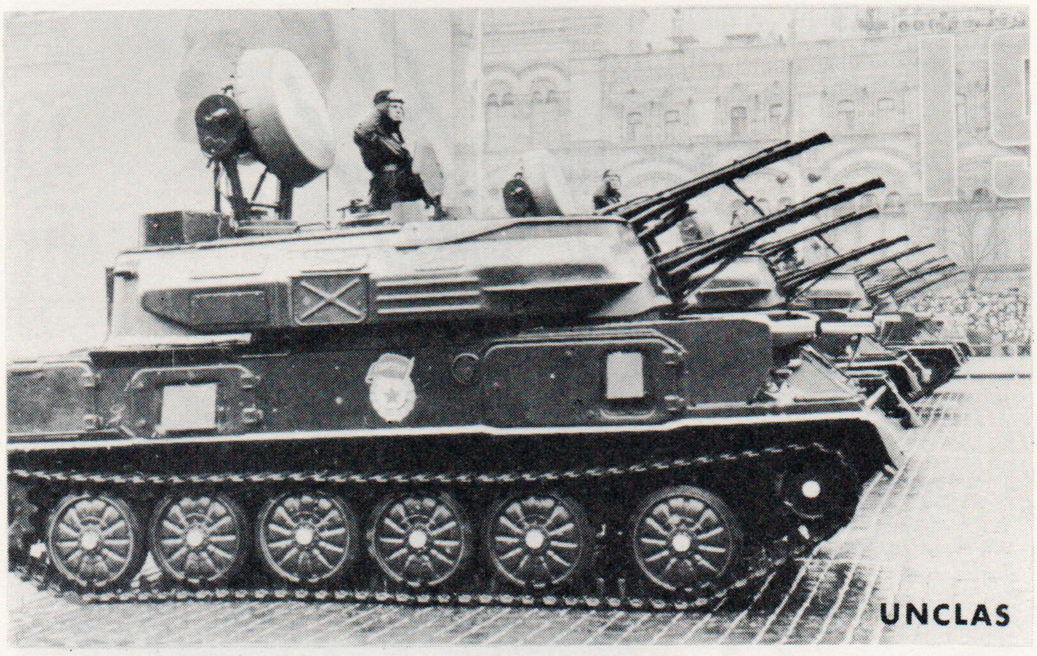


Fig 1. ZSU-23-4s on Parade

The four 23 mm guns are gas operated and liquid cooled, and each barrel can fire at the rate of 1000 rounds per minute to a range of more than 2000 m against fast low flying aircraft. The chassis is based on the PT-76 amphibious tank, which has been used as a basis for other armoured vehicles as well. The armour is not thick but does protect the crew from shell splinters and other debris. The vehicle weighs 14 tons, has a range of 250 kms and carries a crew of 4. The system has a capability against ground targets as well as aircraft and helicopters.

It carries its own fire control radar which is hinged to the rear of the turret and folds down behind the turret during transit. This radar operates on J band, can scan through 360° and then track the detected target accurately. The computer calculates firing data from the information fed in by the radar.

The ZSU-23-4 can also function optically, which is important when operating against low flying targets or in an ECM environment. It is not known how accurate it is when neither range nor angles are produced by the radar.

The ZSU-23-4 is widely deployed with Warsaw Pact tank regiments and travels well forward to give intimate protection to the leading tanks. It has also been deployed in Vietnam and in the Middle East.

There is no doubt that the ZSU-23-4 is a potent threat to aircraft and helicopters. Despite the fact that it has been in service for 10 years, it will almost certainly remain deployed for many years to come.

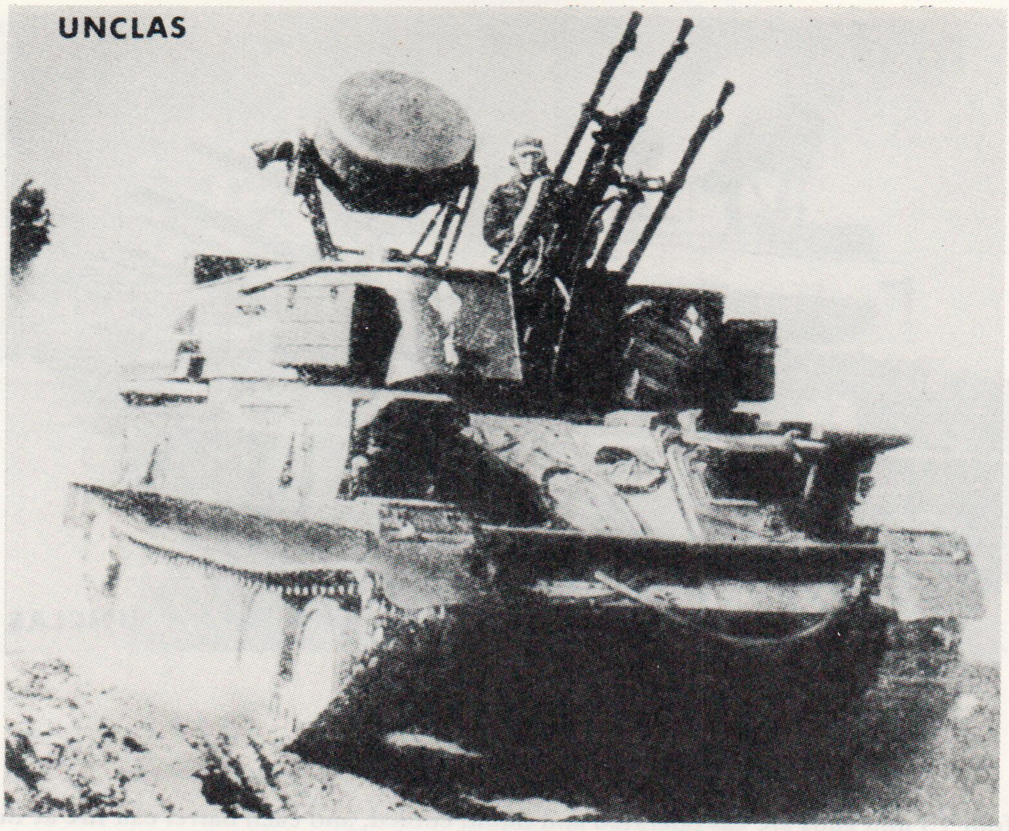


Fig 2. ZSU-23-4 moving across country

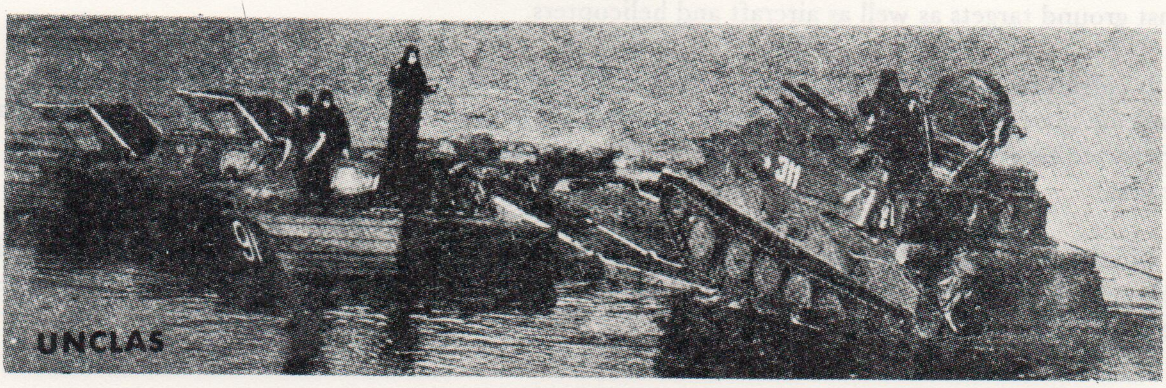


Fig 3. ZSU-23-4 ferrying a river

7. Rapid Decontamination Machines

The Soviet TMS-65 was the first Warsaw Pact rapid decontamination machine and was described in ATIR 107. Other Warsaw Pact countries are now following the Soviet lead and have developed their own equipments. The Polish Army announced in October 1974 that the WUS is about to enter service and the Czech magazine 'ATOM' recently published pictures of a similar device.

WUS

The WUS consists of a jet engine mounted on a STAR-266 6 x 6 3½ tonne truck. The engine is claimed to be the Polish SO-1 gas turbine although it is more likely to be the Soviet VK-1A or the Czech M-701, and is mounted at the rear of the truck (Fig 1). Between the cab and the jet engine are two 1800 litre tanks one of which holds fuel, and the other water. Four nozzles around the jet exhaust are connected to the water tank to inject water into the gas stream to remove radioactive fallout. If additional water is required, an IRS decontamination bowser may be connected to the water injection circuit.

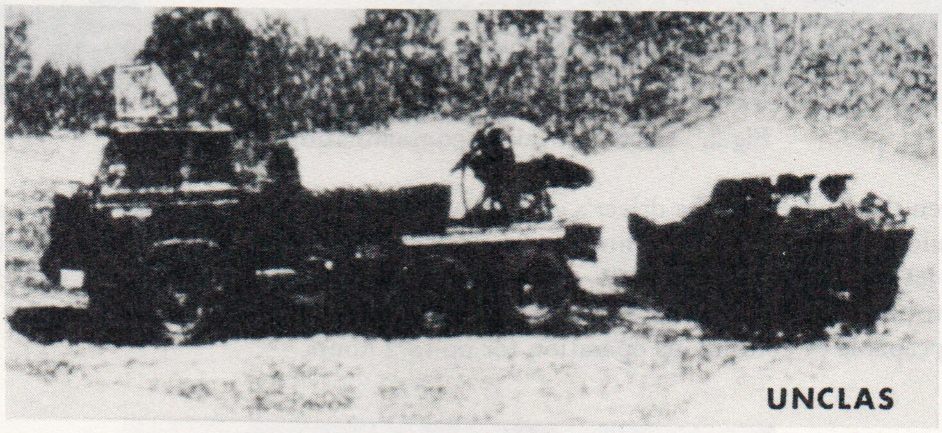


Fig 1. Polish Decontamination Machine WUS

There is no control cab like that on the TMS-65. The controls are normally carried on the rear of the vehicle but are connected inside the driver's cab for operation. A transparent hood attachment is fitted to a hatch above the cab to allow the operator to have a protected vantage point from which to control the decontamination. He may move the jet engine by hydraulic links through 40° in the vertical plane and 180° in the horizontal plane. The operator is protected in his cab from contamination by a KUFS-15 filter-ventilation unit.

In operation the WUS is very similar to TMS-65 and the Czech variant. Contaminated tanks, APCs and heavy vehicles proceed at low speed past 2 machines separated by approximately 50 m and are sprayed on all sides by hot exhaust with or without injected water. For chemical decontamination or 'degassing', up to 15 vehicles may be treated each hour. For radiological decontamination or 'deactivation', the figure rises to 30 per hour. In this latter mode, the WUS should be capable of up to 2 hours continuous operation without refuelling.

Other uses for the WUS are claimed to be the removal of snow from airfields and, with suitable extra equipment, the generation of smoke screens.

Czechoslovakian Version

Nothing has been claimed by the Czechs regarding this vehicle (Fig 2) but a certain amount may be deduced.

The jet engine which is probably the Czech M-701 gas turbine is enclosed and in silhouette appears like that on the Polish WUS. The vehicle is the TATRA-148 which is supposed to end its production run this year. It is possible therefore than when issued, in its final form, the Czech equipment may be mounted on the TATRA 815, due in production in 1976.

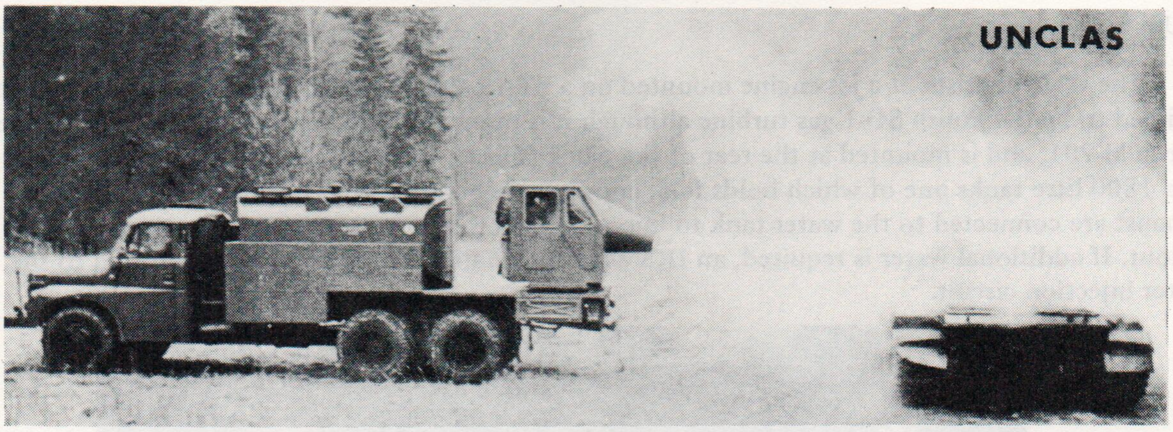


Fig 2. Czechoslovak Decontamination Machine

Between the engine and the driver's cabin is a bowser section which may contain as much as 4500 litres of liquid, possibly up to 2000 litres each of kerosine fuel and water. A control cab is mounted next to the jet engine, like the TMS-65, and this will presumably be hermetically sealed to give ample protection to the operator. The operation of this machine is believed to be very similar to that of the WUS, being capable of continuous operation for up to 2 hours.

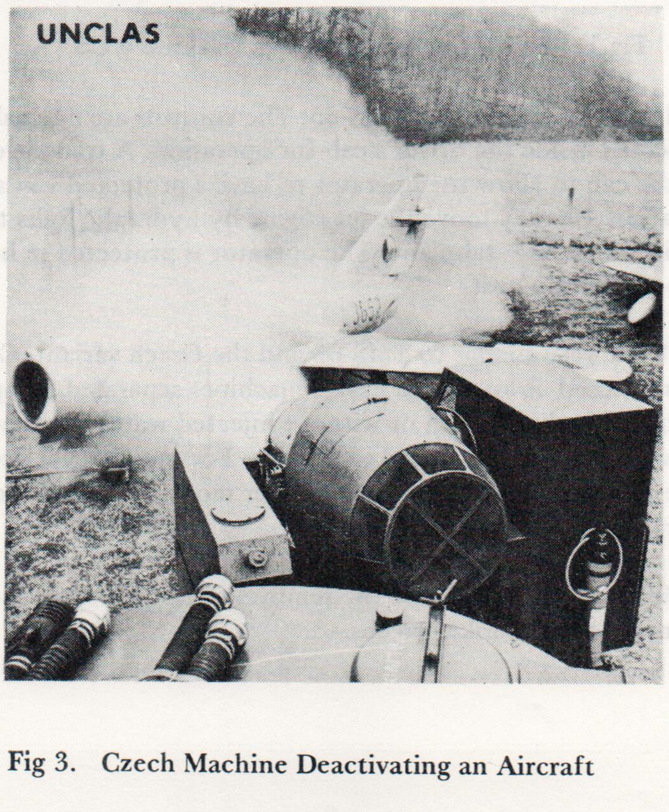


Fig 3. Czech Machine Deactivating an Aircraft

Apart from treating contaminated AFVs the Czech variation of the TMS-65 may be used to deactivate aircraft (Fig 3). Although it is clear that water has been injected into the exhaust (Figs 2 and 3) there are no feed pipes to be seen. The engine is more completely enclosed than the VK-1A of TMS-65 with a wire mesh screen over the intake to exclude debris and as a consequence will be easier to maintain in a clean state. It may also reduce the noise of the engine.

CONCLUSION

Both the WUS and the Czechoslovak version of TMS-65 are better designed than the much older Soviet equipment. Although capable of degassing contaminated vehicles the fuel consumption and rate of treatment will limit this use to the cleaning of not more than a priority company of AFVs.

The primary task of these machines is believed to be the removal of radioactive fallout contamination. Again, because of fuel consumption and rate of treatment, it is not expected that more than a battalion of AFVs will be deactivated at any one time.

Both machines, like TMS-65, will be useful in winter for warming contaminated vehicles prior to treatment by ARS or IRS decontamination bowsers.

Rys. W. FUGLEWICZ

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8. Loading the Soviet PKP Wheeled Amphibious Trailer

Details of the PKP wheeled amphibious trailer were published in ATIR 98 of January 1971. The description below shows how this unusual vehicle and the PTS tracked amphibious transporter which tows it are loaded.

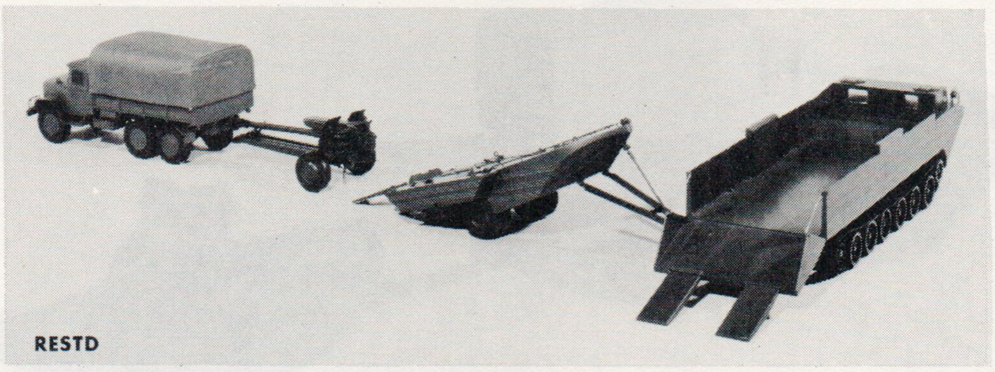

Fig 1. PKP Prepared for Loading Gun

The transporter with trailer attached is reversed to turn the trailer at a right-angle to the transporter and in this position the towing attachment of the transporter is clear of the ramp, which is then lowered. The flotation tanks on the trailer are swung out and secured, the rear support stands lowered and the trailer tilted to ground level. The loading ramps are then swung out (Fig 1). The truck reverses the gun on to the trailer (Fig 2) where it is positioned by the wheels on the gun coming to rest in the cavities in the deck of the trailer. The gun is then uncoupled from the truck and secured to the trailer by chains (Fig 3).

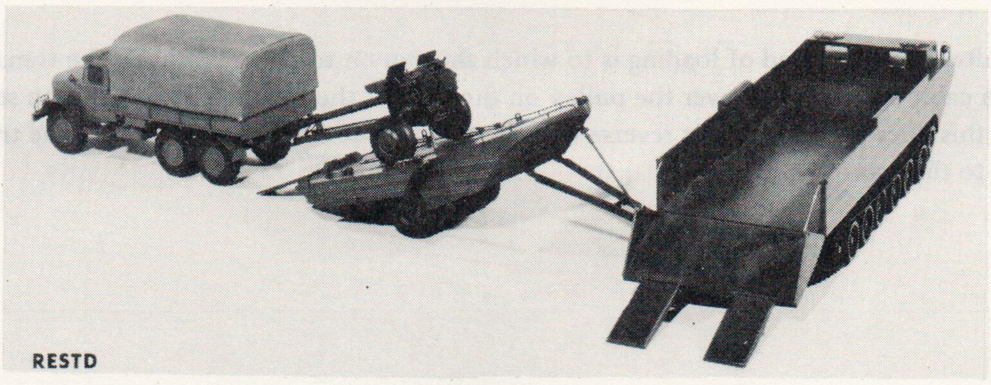

Fig 2. Gun Loaded on PKP

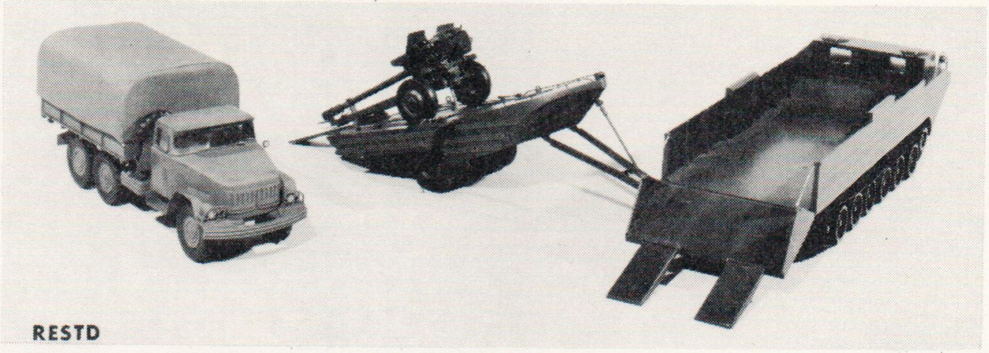

Fig 3. Gun secured on PKP and Vehicle proceeding to board PTS

The truck is driven on board the PTS, the ramps on both transporter and trailer are raised and the trailer tilted back to the towing position. (Fig 4). The whole system is now ready to cross the water barrier. Unloading is carried out in a reverse procedure.

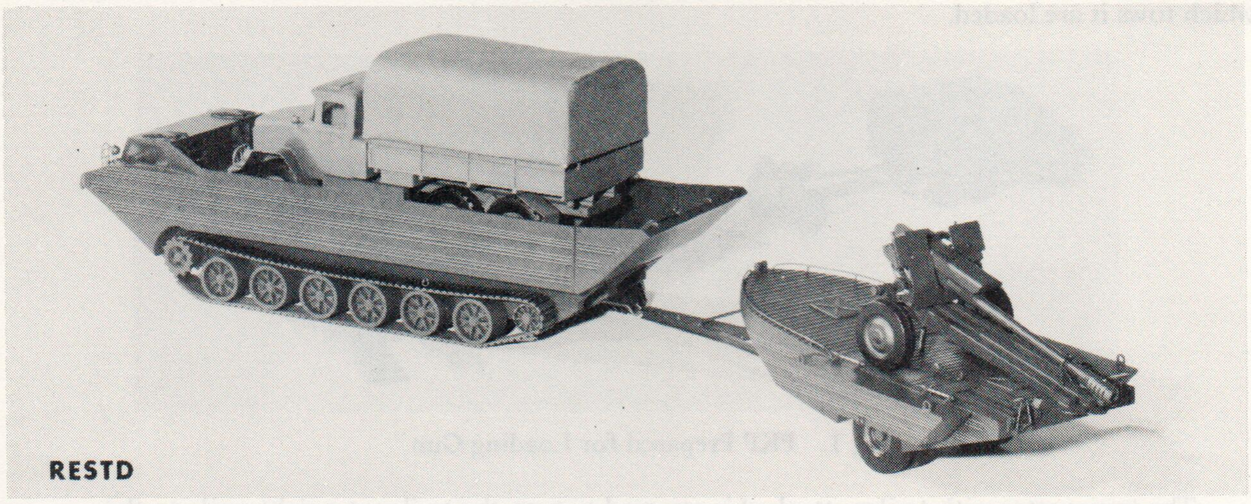

Fig 4. The whole System ready to cross Water Barrier

The alternative method of loading is to winch the gun on to the trailer with the transporter's own winch cable which passes over the pulley on the bow of the trailer. The gun is then secured and only after this does the transporter reverse in order to turn the trailer at 90° so that the truck can be loaded on to the transporter.

9. R-111 VHF Transceiver

The range of Warsaw Pact VHF radios formed by the R-105-M, R-108-M, R-109-M and R-114-M are currently being replaced by a single man pack set with wider frequency coverage – the R-107. On major command links and where extra range was required the R-105 sets were used with a radio frequency (RF) amplifier to increase the power output from 1.3 watts to 50 watts. We have therefore been expecting for some time now to see an RF amplifier for use with the R-107, but instead a totally new set, the R-111 has appeared.

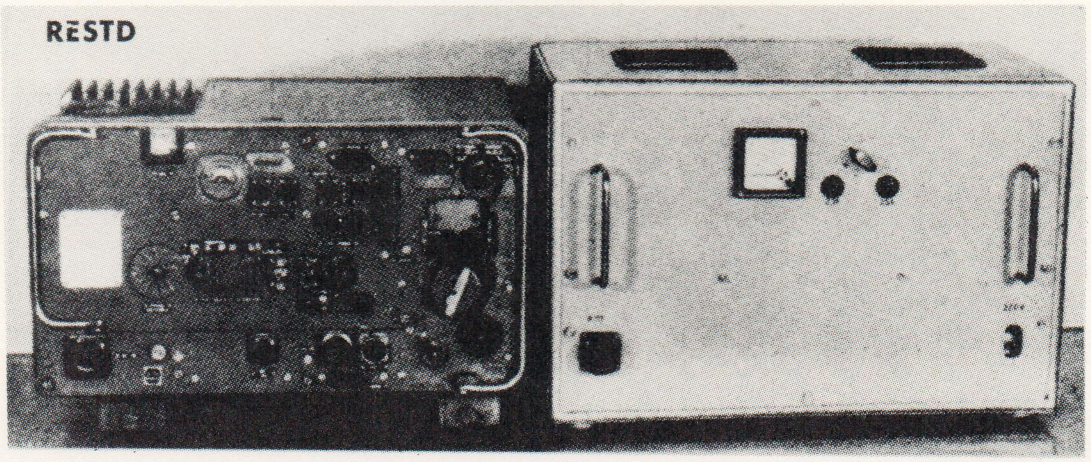

Fig 1. VHF Transceiver R-111

The R-111 which was probably introduced in the late 1960s, consists of a transceiver and a RF amplifier. The set probably contains a mixture of transistors and miniature valves and is of modular construction, with units built on printed circuit boards which can be taken out for repair or replacement. It has automatic tuning which is a significant advance in Soviet design for tactical radio sets.

Technical Details

Frequency Range	20 – 52 MHz
Tuning	Automatic tuning by use of motors and gears
No of Preset Frequencies	4
Type of Transmission	Voice
Power Output	Probably more than 50 watts
Power Supply	26 volt vehicle battery

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10. Non Soviet Warsaw Pact MT

Hungary and Poland have both recently produced their own vehicles for the 3–5 tonne range. Both the CSEPEL D-566 and the STAR-266 are modern vehicles with up-to-date features, are reliable and very mobile. Both are capable of keeping up with AFVs over all but the worst terrain and explain in some measure why no tracked logistic vehicle is produced by either country.

In ATIR 107, information was given regarding the central tyre inflation system fitted to most Soviet trucks. This device is not limited to Soviet vehicles as may be seen below.

CSEPEL D-566

The Hungarian Army has since 1971 taken delivery of a new diesel GS truck, the CSEPEL D-566 (pronounced "Cheppel"). (Fig 1). The designation stands for Diesel, 5 tonne, 6 x 6 drive. Manufacture began in 1970 but few have been seen in service until this year.

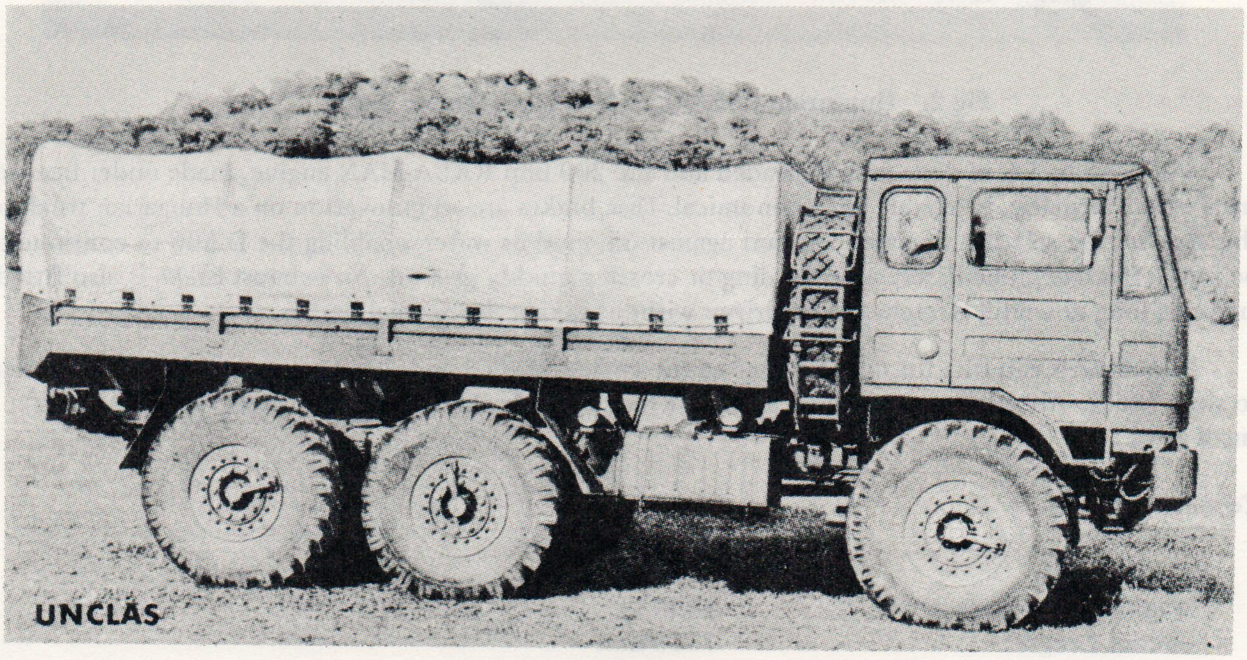

Fig 1. Hungarian CSEPEL D-566. Five Tonne Truck

The D-566 is a great improvement on the D-344 (Fig 2) and may tow 5,000 kg across country or 10,000 kg on roads. A winch is available for extricating the vehicle if stuck although the central tyre inflation system fitted to the wheels should greatly reduce the likelihood of this happening. The differential locks with which it is fitted will also be an asset when driving on greasy or icy roads.

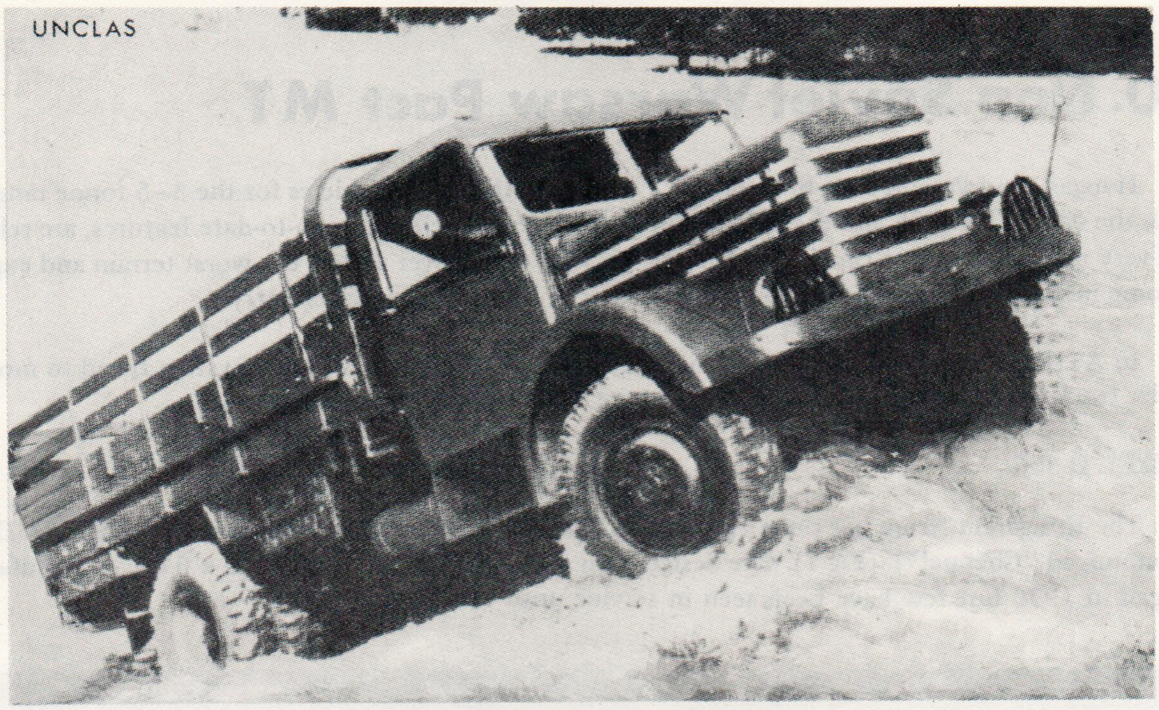

Fig 2. Hungarian CSEPEL D-344 Three Tonne Truck

Fords up to 1.2 m deep may be waded and the 200 bhp RABA-MAN engine, made under licence from West Germany, is reliable and economical. Disc brakes are an innovation on a Hungarian truck of this size but are self cleaning and resistant against oil, mud or water, enabling the D-566 to continue to be fully effective immediately after fording or crossing muddy ground. An exhaust brake is also fitted, enabling long downhill stretches to be driven without taxing the normal brakes.

The driver's cab tilts for maintenance of the engine, seats 3 and may be converted to allow 2 men to sleep inside. Above the commander's seat is a hatch which may be used for observation or firing small arms.

Technical Details

Kerb Weight:	9220 kg
Maximum Payload:	5000 kg
Overall Length:	7180 mm
Overall Width:	2500 mm
Overall Height:	2740 mm
Wheelbase:	2900 + 1400 mm
Maximum Track Width:	2050 mm
Ground Clearance:	465 mm
Engine Type:	RABA-MAN 2156 HM 6/01 4 stroke diesel, 6 cylinder in-line, 10.35 litres
Brake Horse Power:	200 at 2200 RPM
Torque:	73 kgm at 1400 RPM
Maximum Speed:	80 km/h
Tyre Size:	14.00 x 20
Fuel Consumption (rated):	36 litres/100 km
Fording Depth:	1200 mm

POLISH STAR-266

ATIR 102 gave a full description of the Polish automobile industry and the then current range of vehicles, one of which was the standard military 4 tonne 6 x 6 GS truck, the STAR-660 M2 (Fig 3).

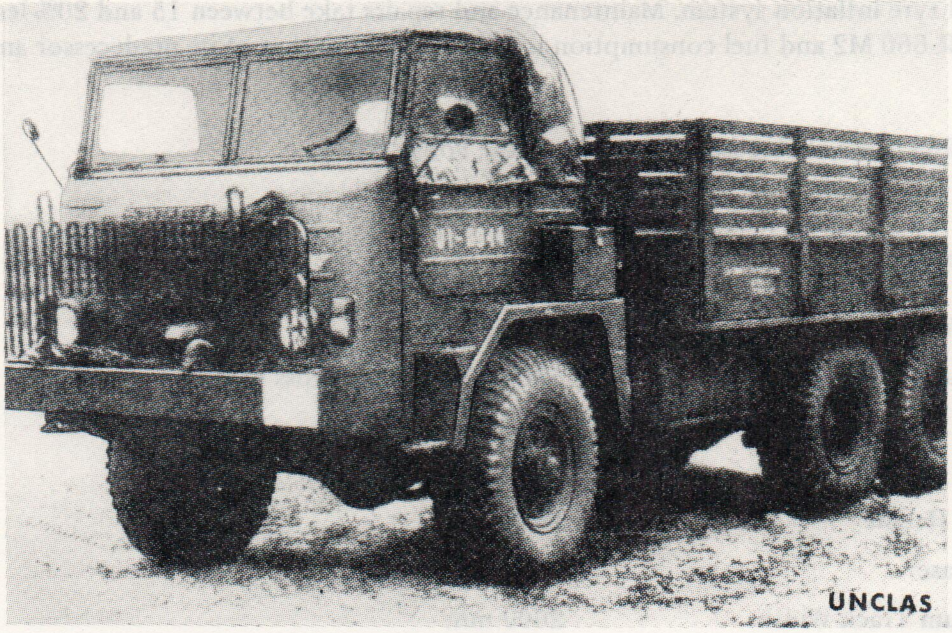

Fig 3. Polish STAR-660 M2 Four Tonne Truck

In 1973 the Polish automobile industry began preparations for production of the STAR-266, having made prototypes as early as 1969.

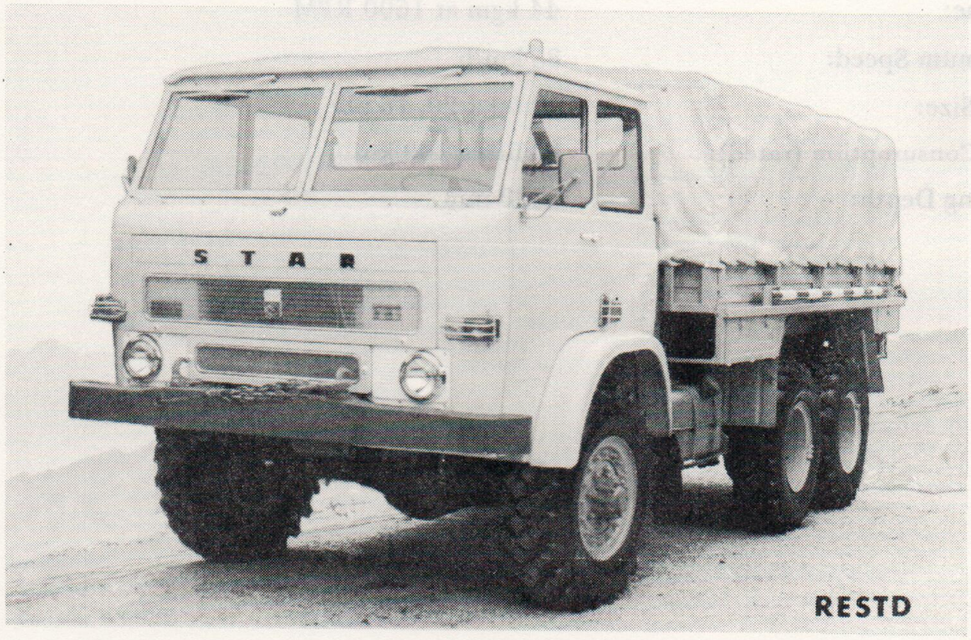

Fig 4. Polish STAR-266 Truck

The STAR-266 (Fig 4) is a 3-axle cross-country vehicle with a payload of 3500 kg. It may be used for transporting military equipment or to tow trailers or other equipment weighing up to 4000 kg.

Folding benches mounted on the cargo section allow 24 fully equipped soldiers to be carried and box bodies may be mounted on the chassis.

The STAR-266 has a good fording capability, high ground clearance, independent suspension and a central tyre inflation system. Maintenance and repairs take between 15 and 20% less time than for the STAR-660 M2 and fuel consumption is 25% better than that of its predecessor and the Soviet ZIL-131.

STAR-266 is now being issued to units of the Polish Army.

Technical Details

Kerb Weight:	6550 kg
Maximum Payload:	5000 kg (3500 kg cross country)
Overall Length:	6800 mm
Overall Width:	2500 mm
Overall Height:	2640 mm
Wheelbase:	2970 + 1250 mm
Maximum Track Width:	2000 mm
Ground Clearance:	325 mm
Engine Type:	S-359 4 stroke diesel, 6 cylinder in-line, 6.842 litres
Brake Horse Power:	150 at 2800 RPM
Torque:	44 kgm at 1600 RPM
Maximum Speed:	88 km/h
Tyre Size:	12.00 x 20, 16 ply
Fuel Consumption (rated):	30 litres/100 km
Fording Depth:	1800 mm